

## Teacher Notes - KEY

CRS	FUN601 – Evaluate composite functions at integer values.
Objective	Evaluate composite functions at integer values.

**Teacher Notes:** Student notes are in italics and should be written in student notebooks

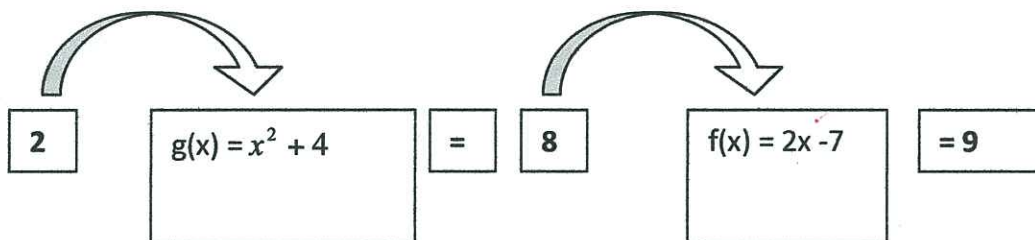
**Composition of functions:** Process through which an entire function is substituted into another function.

Two types of composition notation: 1)  $f(g(x))$  and 2)  $(f \circ g)(x)$ . Read:  $f$  of  $g$  of  $x$ .

**Example 1:** Let  $f(x) = 2x - 7$  and  $g(x) = x^2 + 4$ . What is the value of  $f(g(2))$ ?

**Step 1:** Substitute the value into the "inside" function.

**Step 2:** Substitute the value from step 1 (the inside function) into the "outside" function.



$$f(g(2)) = 9.$$

Now find $g(f(2))$ . $f(2) = -3$ $g(-3) = 13$ Did you get the same answer? No	What does that tell you about the order in which you evaluate the functions? Always sub value into "inside" function first.
<b>Example 2:</b> a. Let $f(x) = 3x + 5$ and $g(x) = x - 7$ , find $(g \circ f)(4)$ . $f(4) = 17$ $g(17) = 10$	b. Find $(f \circ g)(4)$ . $g(4) = -3$ $f(-3) = -4$ c. Find $f(g(2))$ $g(2) = -5$ $f(-5) = -10$
<b>Practice!</b>	
1) Let $f(x) = 5x + 2$ and $g(x) = x - 2$ . a) Find $f(g(-4))$ . $g(-4) = -6$ $f(-6) = -28$ b) Find $g(f(-4))$ . $f(-4) = -18$ $g(-18) = -20$	2) Let $p(x) = x^2 + x$ and $r(x) = x + 4$ . a) Find $(p \circ r)(2)$ . $r(2) = 6$ $p(6) = 42$ b) Find $(r \circ p)(2)$ . $p(2) = 6$ $r(6) = 10$
3) Let $w(x) = 3x^2 + x - 2$ . Find $w(w(-2))$ . $w(-2) = 8$ $w(8) = 198$	4) Let $j(x) = 5x^2 + x$ and $k(x) = -0.5x$ . a) What is $j(k(6))$ ? $k(6) = -3$ $j(-3) = 42$ b) What is $(k \circ j)(6)$ ? $j(6) = 96, 486$

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<p>5) Let <math>p(x) = x^2 + x</math>. Find <math>p(p(-6))</math>.</p> <p><math>p(-6) = 30</math>  <math>p(30) = 930</math></p>	<p>6) Let <math>q(x) = 5x^2 - 4x + 3</math>. Find <math>q(q(-2))</math>.</p> <p><math>q(-2) = 31</math>  <math>q(31) = 4684</math></p>								
<p>7) Let <math>f(x) = 3x - 2</math> and <math>g(x) = \sqrt{x}</math>.</p> <p>a) Find <math>f(g(25))</math>. <math>g(25) = 5</math>  <math>f(5) = 13</math></p> <p>b) Find <math>g(g(1296))</math>. <math>g(1296) = 36</math>  <math>g(36) = 6</math></p>	<p>8) Let <math>w(x) = x^2 + 2</math> and <math>r(x) = -\sqrt{x}</math>.</p> <p>a) Find <math>(w \circ r)(9)</math>.  <math>r(9) = -3</math>  <math>w(-3) = 11</math></p> <p>b) Find <math>(r \circ r)(256)</math>.  <math>r(256) = -16</math>  <math>r(-16) = -4i</math></p>								
<p>9) Let <math>f(x) = 6x + 3</math>, <math>g(x) = \frac{x+2}{5}</math>, and <math>h(x) = -7x</math>. Find <math>h(f(g(3)))</math>.</p> <p><math>g(3) = 1</math>  <math>f(1) = 9</math>  <math>h(9) = -63</math></p>	<p>10) Let <math>f(x) = 2x - 2</math>, <math>g(x) = \frac{1}{4}x</math>, and <math>h(x) = 2x</math>. Find <math>g(h(f(7)))</math>.</p> <p><math>f(7) = 12</math>  <math>h(12) = 24</math>  <math>g(24) = 6</math></p>								
<p>11) Create your own composition of functions:</p> <p>a) <math>f(x) = \underline{\hspace{2cm}}</math>  b) <math>g(x) = \underline{\hspace{2cm}}</math>  c) Find <math>\underline{\hspace{2cm}}</math></p> <p><i>varies</i></p> <p>Have your neighbor solve.</p>	<p>12) Create your own composition of functions:</p> <p>a) <math>f(x) = \underline{\hspace{2cm}}</math>  b) <math>g(x) = \underline{\hspace{2cm}}</math>  c) Find <math>\underline{\hspace{2cm}}</math></p> <p><i>varies</i></p> <p>Have your neighbor solve.</p>								
<p align="center"><b>ACT Style: THINK problems!</b></p>									
<p>1) Dominique gets a job selling magazine subscriptions over the phone, she must make 62 calls each day. <del>She</del> her contract states that she makes 50 cents for every call she makes and an additional 15 cents for every subscription she sells. However, she loses 20 cents for every customer she calls that does not buy a newspaper. In the last 7 days, Dominique made all of her calls and 42 customers bought newspapers while 20 did not buy newspapers. How much did Dominique earn?</p> <p><math>50(62) + 42(15) - 20(20)</math>  <math>1516 + 630 - 400 = 1746</math>  <math>\\$1746</math></p>	<p>2) If you choose a number greater than 4 for <math>y</math> and substitute it into each of the 4 algebraic expressions below, which expression if any will always have the greatest value?</p> <p><math>y &gt; 4</math></p> <p>A. <math>y^3</math>  B. <math>3y</math>  C. <math>y + 3</math>  D. <math>y - 3</math>  E. <del>None will always have the greatest value.</del></p> <p><u>Trial 1</u>      <u>Trial 2</u></p> <table border="0"> <tr> <td><math>5^3</math></td> <td><math>20^3</math></td> </tr> <tr> <td><math>3(5)</math></td> <td><math>3(20)</math></td> </tr> <tr> <td><math>5+3</math></td> <td><math>20+3</math></td> </tr> <tr> <td><math>5-3</math></td> <td><math>20-3</math></td> </tr> </table>	$5^3$	$20^3$	$3(5)$	$3(20)$	$5+3$	$20+3$	$5-3$	$20-3$
$5^3$	$20^3$								
$3(5)$	$3(20)$								
$5+3$	$20+3$								
$5-3$	$20-3$								

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<p>3) Hot dogs outsell hamburgers 6 to 5. If there were 78 hot dogs sold today, how many hamburgers were sold?</p> <p>Hot 6 = 78 Ham 5 = x 6x = 390 x = 65 ham</p>	<p>4) If <math>x(y + 1) = 0</math>, which of the following must be true?</p> <p>A. x must equal 0. B. <math>(y + 1)</math> must equal 0. C. Either x or <math>(y + 1)</math> must equal 0. D. Both x and <math>(y + 1)</math> must equal 0. E. Neither x nor <math>(y + 1)</math> equals 0.</p>
<p>5) Ms. McCarter wants to put carpet down in her apartment. She knows that a box of 25 carpet squares will cover 375 square feet of floor. According to these figures, what is the minimum number of boxes of 25 carpet squares needed to completely cover Ms. McCarter's apartment, which has dimensions 38 feet by 75 feet?</p> <p><math>38(75) = 2,850 \text{ ft}^2</math> <math>\div 375</math> 7.6</p> <p>A. 4   B. 5   C. 6   D. 7   E. 8</p>	<p>6) Shontrell went to sleep at 10:15 P.M. and woke up at 6:00 A.M. How many hours was Shontrell asleep?</p> <p>7 3/4</p> <p>A. <math>7\frac{1}{4}</math>   B. <math>6\frac{3}{4}</math>   C. <math>7\frac{3}{4}</math> D. <math>4\frac{3}{4}</math>   E. <math>6\frac{1}{4}</math></p>
<p>7) Juan gets a job delivering pizzas, he must deliver 25 pizzas each day. Juan makes a deal with his boss that he will make 75 cents for every pizza he delivers and an additional 15 cents for every customer who calls in to give him a positive review. However, he loses 20 cents for every customer calls in to give him a negative review. In the last 7 days, Juan made all of his deliveries and 30 customers called to give him positive reviews, while 13 called to give him a negative review. How much did Juan earn?</p> <p><math>.75(25) + .15(30) - 0.2(13)</math> \$20.65</p>	<p>8) Which of the following patterns will determine each term after the first term of sequence that begins with 1 and continues with 4, 13, 40, 121, ...?</p> <p>A. Doubling the previous number B. Doubling the previous number and adding 1 C. Squaring the previous number and subtracting 2 D. Tripling the previous number and adding 1 E. Quadrupling the previous number</p>

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Objective	Evaluate composite functions at integer values.

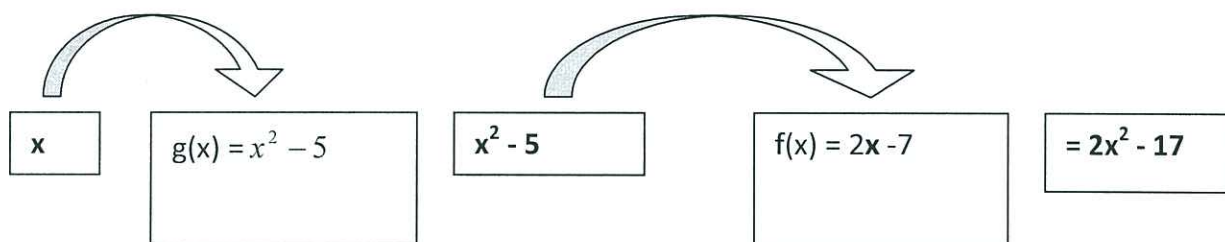
**Mixed Review.**

1) Explain how to solve the following composition of functions:  If $f(x) = \frac{1}{2}x - 6$ and $g(x) = 8x$ , what is $g(f(8))$ ? <i>varies</i> $g(-2) = \boxed{-16}$	2) If $h(x) = \frac{3x-4}{5}$ and $j(x) = -2x$ , what is $(h \circ j)(0.5)$ ? $h(-1) = \boxed{-7/5}$	3) If $g(x) = \sqrt{x}$ and $h(x) = 18 - x$ , what is $g(g(256))$ ? $\boxed{4}$
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**Example 1:** Let  $f(x) = 2x - 7$  and  $g(x) = x^2 + 4$ . What is the value of  $f(g(x))$ ?

**Step 1:** Substitute the expression into the "inside" function.

**Step 2:** Substitute the expression from step 1 (the inside function) into the variable for the "outside" function.



$f(g(x)) = 2x^2 - 17$ ; the solution is an expression rather than a numerical value!

**Example 2:** Let  $f(x) = 2x - 7$  and  $g(x) = x^2 - 5$ . What is the value of  $g(f(x))$ ?

$$(2x-7)^2 - 5$$

$$4x^2 - 14x + 49 - 5$$

$$4x^2 - 14x + 44$$

**New Stuff.**

4a) Compute $f(g(x))$ if $g(x) = 2x + 1$ and $f(x) = x - 3$ . $(2x+1) - 3 = \boxed{2x-2}$	5a) If $g(x) = 3x + 2$ and $f(x) = x^2 + 3$ , compute $(f \circ g)(x)$ . $3(x^2+3) + 2 = 3x^2 + 9 + 2 = \boxed{3x^2 + 11}$
b. Compute $g(f(x))$ if $g(x) = -2x + 1$ and $f(x) = -x - 3$ . $-2(-x-3) + 1 = 2x + 6 + 1 = \boxed{2x+7}$	b. If $g(x) = \frac{2}{5}x + 2$ and $f(x) = x^2 + 3$ , compute $g \circ f(x)$ . $\frac{2(x^2+3)}{5} + 2 = \frac{2x^2+6}{5} + \frac{10}{5} = \frac{2x^2+16}{5}$
c. Compute $f(f(x))$ if $g(x) = 8x^2$ and $f(x) = 0.5x - 2$ . $0.5(0.5x-2) - 2 = 0.25x - 1 - 2 = \boxed{0.25x-3}$	c. Compute $g \circ g(x)$ if $g(x) = 2x + 1$ and $f(x) = 1x - 3$ . $2(2x+1) + 1 = 4x + 2 + 1 = \boxed{4x+3}$
6) Compute $a(b(x))$ if $a(x) = 2x - 1$ and $b(x) = 3x + 3$ . $2(3x+3) - 1 = 6x + 6 - 1 = \boxed{6x+5}$	7) Compute $b(a(x))$ if $a(x) = 2x - 1$ and $b(x) = 3x + 3$ . $3(2x-1) + 3 = 6x - 3 + 3 = \boxed{6x}$

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<p>8) Compute <math>a(b(x))</math> if <math>a(x) = \frac{x-6}{8}</math> and <math>b(x) = 2x-8</math>.</p> $\frac{2x-8-6}{8} = \frac{2x-14}{8} = \frac{x-7}{4}$	<p>9) Compute <math>b(b(x))</math> if <math>a(x) = 2x-1</math> and <math>b(x) = 8x - \frac{3}{4}</math>.</p> $8(8x - \frac{3}{4}) - \frac{3}{4} = 64x - 21\frac{1}{4}$
<p>10) Compute <math>a(b(-2))</math> if <math>a(x) = -5x^3</math> and <math>b(x) = \frac{1}{2}x^2 - 2</math>.</p> $b(-2) = 0 \quad a(0) = 0$	<p>11) Compute <math>b(a(-2))</math> if <math>a(x) = 2x-1</math> and <math>b(x) = 3x+3</math>.</p> $a(-2) = -5 \quad b(-5) = -12$
<p><b>Example 3:</b> Let <math>g(x) = x^2 + 3x - 11</math> and <math>j(x) = x + 2</math>.</p> <p>a. Find <math>g \circ j(x)</math>.</p> $(x+2)^2 + 3(x+2) - 11 = x^2 + 4x + 4 + 3x + 6 - 11 = x^2 + 7x - 1$ <p>b. Find <math>j \circ g(x)</math>.</p> $x^2 + 3x - 11 + 2 = x^2 + 3x - 9$	<p>12) Let <math>f(x) = x^2 - 10</math> and <math>j(x) = 2x + 2</math>.</p> <p>a. Find <math>f \circ j(x)</math>.</p> $(2x+2)^2 - 10 = 4x^2 + 4x + 4 - 10 = 4x^2 + 4x - 6$ <p>b. Find <math>j \circ f(x)</math>.</p> $2(x^2 - 10) + 2 = 2x^2 - 18$
<p>13) Let <math>k(x) = x + 2</math> and <math>j(x) = x^2 - 0.5x - 8</math>.</p> <p>a. Find <math>j(k(x))</math>.</p> $(x+2)^2 - 0.5(x+2) - 8 = x^2 + 4x + 4 - 0.5x - 1 - 8 = x^2 + 3.5x - 5$ <p>b. Find <math>k(k(x))</math>.</p> $(x+2) + 2 = x + 4$	<p>14) Let <math>f(x) = 2x^2 - 18</math> and <math>g(x) = x - 3</math>.</p> <p>a. Find <math>g \circ f(x)</math>.</p> $2x^2 - 18 - 3 = 2x^2 - 21$ <p>b. Find <math>f \circ g(x)</math>.</p> $2(x-3)^2 - 18 = 2(x^2 - 6x + 9) - 18 = 2x^2 - 12x + 18 - 18 = 2x^2 - 12x$
<p><b>CHALLENGE PROBLEMS &amp; ACT Style</b></p>	
<p>15) If <math>\nabla x = x^2 - x</math> for all integers, then <math>\nabla 3 =</math></p> <p>A. 27  <u>B. 30</u>          C. 58          D. 72</p> <p><math>\nabla 3 = 6</math>  <math>\nabla 6 = 30</math></p>	<p>16) If <math>f(x) = 2x^2 + x</math> and <math>g(x) = f(f(x))</math>, what is the value of <math>g(1)</math>?</p> <p>A. 3          B. 18  <u>C. 21</u>          D. 39</p> <p><math>g(1) = f(f(1))</math>  <math>f(1) = 3</math>  <math>f(3) = 21</math></p>

Teacher Notes - KEY

CRS	NCP508 - Determine when an expression is undefined
Objective	6.3 Determine undefined values for rational expressions

Mixed Review.

1) If $j(x) = 3x - 1$ and $k(x) = x^2 - 5$ , compute $j \circ k(x)$ . $3(x^2 - 5) - 1$ $3x^2 - 16$	2) If $j(x) = 3x - 1$ and $k(x) = x^2 - 5$ , compute $k \circ j(x)$ . $(3x - 1)^2 - 5$ $9x^2 - 6x - 4$	3) If $j(x) = 3x - 1$ and $k(x) = x^2 - 5$ , compute $k \circ j(-1)$ . $j(-1) = -4$ $k(-4) = 11$
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Have students watch 4 minute clip as to WHY dividing by zero results in an answer of "undefined":  
[https://www.khanacademy.org/math/algebra/algebra-functions/undefined\\_indeterminate/v/why-dividing-by-zero-is-undefined](https://www.khanacademy.org/math/algebra/algebra-functions/undefined_indeterminate/v/why-dividing-by-zero-is-undefined)

**Directions:** Write the fractions below as a decimal or an integer. Record responses in your notebook.

a. $\frac{1}{2} = 0.5$ b. $\frac{4}{2} = 2$ c. $\frac{0}{2} = 0$ d. $\frac{4}{0} = \text{Undefined}$	When is an expression involving a fraction undefined? $\text{when denominator} = 0$
Asymptote: Lines which correspond to the zeroes (or undefined values) of the denominator of a rational function.  Example: $\frac{x}{x - 4}$  Undefined at: $x - 4 = 0$ $x = 4$  Look at your table! When $x = 4$ ; it reads ERROR. Notice how the graph goes toward positive and negative infinity at the asymptote, but NEVER actually hits it (at $x = 4$ ).	

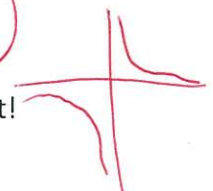


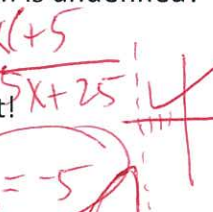
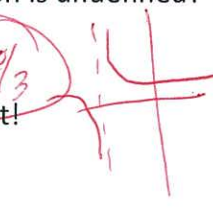
New Stuff!

Example 1: State the excluded x-value. 	2) State the excluded x-value. 	3) State the excluded x-value. 
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*\*Don't need to factor top...I was simplifying @ first lol! \**

<p><b>Example 2:</b> a) When is the following expression undefined? <math>\frac{24}{6x}</math> <i><math>x=0</math></i> b) Graph to prove it!</p> 	<p><b>Example 3:</b> a) For what value of x is the following expression undefined? <math>\frac{4}{2x-12}</math> <i><math>x=6</math></i> b) Graph to prove it!</p> 	<p>4a) What is the value of x when the following expression is undefined? <math>\frac{1}{x-9}</math> <i><math>x=9</math></i> b) Graph to prove it!</p> 
<p>5a) What is the value of x when the following expression is undefined? <math>\frac{x^2+4x-2}{x}</math> <i><math>x=0</math></i> b) Graph to prove it!</p> 	<p>6a) What is the value of x when the following expression is undefined? <math>\frac{2-x}{3x+16}</math> <i><math>x=-16/3</math></i> b) Graph to prove it!</p> 	<p>7) State the undefined value(s) of the function: <math>\frac{v+4}{10v+40}</math> <i><math>v=-4</math></i></p>
<p><b>Example 4:</b> What is the sum of the values that make the following expression undefined? <math>\frac{r^2+15r+56}{r^2+6r-16}</math> <i><math>(r+8)(r+7)</math> <math>(r+8)(r-2)</math> <math>-8+2=-6</math></i></p>	<p>8) What is the sum of the values that make the following expression undefined? <math>\frac{m+5}{m^2-10m+25}</math> <i><math>(m-5)(m-5)</math></i> a) -10 b) -5 c) 0 <i>d) 5</i> e) 10</p>	<p>9) What are the excluded values of the function below? <math>\frac{x^2+4x+3}{x^2+2x-35}</math> <i><math>(x+3)(x+1)</math> <math>(x+7)(x-5)</math> <math>-7, 5</math></i></p>
<p><b>Example 5:</b> What is the sum of the values that make the following expression undefined? <math>\frac{a^2+11a+10}{a^2+16a+60}</math> <i><math>(a+10)(a+1)</math> <math>(a+10)(a+6)</math> <math>-10-6=-16</math></i></p>	<p>10) What are the excluded value(s) of the function below: <math>\frac{28k-40}{8k-20}</math> <i><math>4(7k-10)</math> <math>4(2k-5)</math> <math>8k-20 \neq 0</math> <math>x=2.5</math></i></p>	<p>11) What is the sum of the values that make the following expression undefined? <math>\frac{n^2-17n+70}{n^2-19n+90}</math> <i><math>10+9=19</math> <math>(n-10)(n-9)</math></i></p>
<p><b>Example 6:</b> When the expression <math>\frac{x}{x-4}</math> is undefined, what is the value of <math>x-9</math>? <i><math>4</math>; <math>-5</math></i></p>	<p>12) When the expression <math>\frac{5}{x+3}</math> is undefined, what is the value of <math>x^2+14x+49</math>? <i><math>-3</math>; <math>16</math></i></p>	<p>13) When the expression <math>\frac{2x^2}{2-x}</math> is undefined, what is the value of <math>x^2+1</math>? <i><math>2</math>; <math>5</math></i></p>
<p>14) What value of a will make the expression <math>\frac{1}{a(a-1)}</math> undefined? i. 0 ii. 1 iii. -1 A. I only <i>B. I and II</i> C. II only D. II and III</p>	<p>15) What is the sum of the excluded values of the following expression: <math>\frac{s^2+16}{s^2+7s-8}</math>? <i><math>(s+8)(s-1)</math> <math>-8+1=-7</math></i></p>	<p>16) How many values for x make the following expression undefined? <math>\frac{\sqrt[3]{x}}{x^2+x-56}</math> A. 0 B. 1 <i>C. 2</i> D. 3 E. Infinitely many <i><math>(x+8)(x-7)</math></i></p>

*17) 18) 19) Write expression with certain undefined values. (17)  $x=8$  (18)  $x=2, -4$  (19)  $v=17, -1$*

**PUSH IT TO THE LIMIT.**



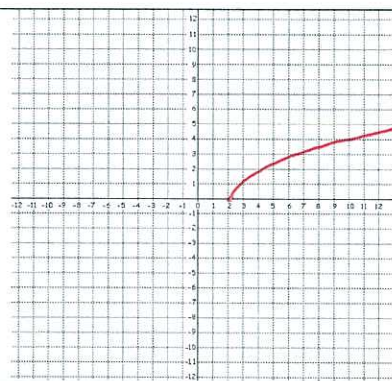
Teacher Notes - KEY

CRS	NCP508 - Determine when an expression is undefined
Objective	6.4 Determine undefined values for radical expressions

Mixed Review.

<p>1) If <math>j(x) = 3x - 1</math> and <math>k(x) = x^2 - 5</math>, compute <math>k \circ j(x)</math></p> <p><math>(3x-1)^2 - 5</math> <math>9x^2 - 6x - 4</math></p>	<p>2a) If <math>j(x) = 3x - 1</math> and <math>k(x) = x^2 - 5</math>, compute <math>j \circ j(x)</math></p> <p><math>3(3x-1) - 1</math> <math>9x - 4</math></p> <p>b) If <math>j(x) = 3x - 1</math> and <math>k(x) = x^2 - 5</math>, compute <math>j \circ k(3)</math>.</p> <p><math>k(3) = 4</math> <math>j(4) = 11</math></p>	<p>3) Explain how to find undefined values of a rational expression.</p> <p>Set the denom = 0. Factor if there is possible!</p>
<p>4) If <math>x</math> is a real number, and the value of <math>\frac{x}{x-2}</math> is undefined, what is the value of <math>x - 10</math>?</p> <p>a) 8 b) 2 c) 0 d) -2 e) -8</p> <p>2; -8</p>	<p>5) What is the sum of the values that make the expression below undefined?</p> <p><math>\frac{x^2 + 10x + 9}{x^2 + 7x - 18}</math></p> <p><math>(x+9)(x-2)</math> <math>-9 + 2 = -7</math></p>	<p>6) What is the product of the values that make the following expression undefined: <math>\frac{h+3}{h^2-7h+12}</math>?</p> <p>a) 4 b) -4 c) 12 d) -12 e) -7</p> <p><math>(h-4)(h-3)</math> <math>4(3)</math></p>

Notes.


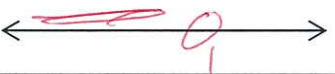

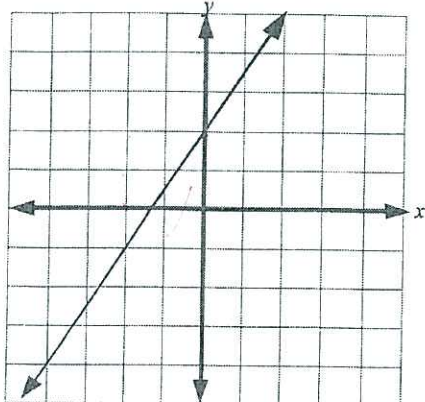
<p>Evaluate the expressions below. Round to the nearest hundredth.</p> <p>a. <math>\sqrt{4} = 2</math> b. <math>\sqrt{3} = 1.73</math> c. <math>\sqrt{0} = 0</math> d. <math>\sqrt{-2} = \text{Non Real}</math></p>	<p>When is a radical expression undefined?</p> <p>When expression under the radical <math>&lt; 0</math>.</p>
<p>Example: <math>\sqrt{4x-8}</math></p> <p>Undefined at: <math>4x - 8 &lt; 0</math> <math>4x &lt; 8</math> <math>x &lt; 2</math></p> <p>Test: <math>\sqrt{4(0)-8} = \sqrt{-4} = \text{undefined}</math></p> <p>Look at your table! When <math>x = 2</math>; it reads ERROR. Notice that any value <math>&lt; 2</math> reads error.</p>	

New Stuff.

<p>Example 1: When is the following expression undefined?</p> <p><math>\sqrt{x+3}</math></p> <p><math>x+3 &lt; 0</math> <math>x &lt; -3</math></p> <p><math>\leftarrow \text{---} 0 \text{---} \rightarrow</math> <math>-3</math></p>	<p>Example 2: When is the following expression undefined?</p> <p><math>\sqrt{2x+4}</math></p> <p><math>2x+4 &lt; 0</math> <math>x &lt; -2</math></p> <p><math>\leftarrow \text{---} 0 \text{---} \rightarrow</math> <math>-2</math></p>	<p>1) When is the following expression undefined?</p> <p><math>\sqrt{1+x}</math></p> <p><math>1+x &lt; 0</math> <math>x &lt; -1</math></p> <p><math>\leftarrow \text{---} 0 \text{---} \rightarrow</math> <math>-1</math></p>
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PUSH IT TO THE LIMIT.



<p>2) When is the following expression undefined?  <math>\sqrt{x-6}</math> <span style="color: red;"><math>x &lt; 6</math></span></p> 	<p>3) When is the following expression undefined?  <math>\sqrt{3x-3}</math> <span style="color: red;"><math>x &lt; 1</math></span></p> 	<p>4) When is the following expression undefined?  <math>\sqrt{2x-10}</math> <span style="color: red;"><math>x &lt; 5</math></span></p> 
<p>5) When is the following expression undefined?  <math>\sqrt{2x+1}</math></p> <p>a. <math>x \geq -\frac{1}{2}</math>  b. <math>x \leq -\frac{1}{2}</math>  <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">c. <math>x &lt; -\frac{1}{2}</math></span>  d. <math>x &gt; -\frac{1}{2}</math>  e. <math>x &gt; \frac{1}{2}</math></p>	<p>6) When is the following expression undefined?  <math>\sqrt{4x-16}</math></p> <p>a. <math>x &gt; \frac{1}{4}</math>  b. <math>x &lt; -\frac{1}{4}</math>  c. <math>x &gt; 4</math>  <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">d. <math>x &lt; 4</math></span>  e. <math>x &gt; -4</math></p>	<p>7) When is the following expression undefined?  <math>\sqrt{25-5x}</math></p> <p>a. <math>x \geq \frac{1}{5}</math> <span style="color: red;"><math>25-5x &lt; 0</math></span>  b. <math>x &lt; -\frac{1}{5}</math> <span style="color: red;"><math>-5x &lt; -25</math></span>  c. <math>x &gt; -\frac{1}{5}</math> <span style="color: red;"><math>x &gt; 5</math></span>  <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">d. <math>x &gt; 5</math></span>  e. <math>x &lt; 5</math></p>
<p>8) When is <math>\frac{1}{\sqrt{3-2x}}</math> defined?</p> <p>i. <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;"><math>x &gt; 1.5</math></span> ii. <math>x \geq 1.5</math> <span style="color: red;"><math>3-2x &lt; 0</math></span>  <span style="color: red;"><math>-2x &lt; -3</math></span>  iii. <math>x &lt; 1.5</math> iv. <math>x \leq 1.5</math> <span style="color: red;"><math>x &gt; 1.5</math></span></p>	<p>9) The expression <math>\sqrt{3x-12}</math> is undefined for what values of x?</p> <p>a) <math>x = 4</math> <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">b) <math>x &lt; 4</math></span>  c) <math>x &gt; 4</math> d) <math>x \geq 4</math>  e) <math>x \leq 4</math></p>	<p>10) The expression <math>\sqrt{x-2}</math> is undefined for what values of x?</p> <p>a) <math>x = 2</math>  b) <math>x \leq 2</math>  c) <math>x \geq 2</math>  <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">d) <math>x &lt; 2</math></span>  e) <math>x &gt; 2</math></p>
<b>ACT STYLE!!!</b>		
<p>11)  What is the equation of the line graphed below?</p>  <p>A. <math>y = -\frac{2}{3}x + 2</math>  B. <math>y = \frac{2}{3}x - \frac{4}{3}</math>  C. <math>y = \frac{2}{3}x + 2</math>  D. <math>y = \frac{3}{2}x - \frac{4}{3}</math>  <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">E. <math>y = \frac{3}{2}x + 2</math></span></p>	<p>12)  What is the value of <math>2\sqrt{y+x^2}</math> when <math>y=9</math> and <math>x=-3</math>?</p> <p>A. 0  B. 12  <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">C. <math>6\sqrt{2}</math></span>  D. <math>18\sqrt{2}</math>  E. 36</p> <p style="color: red; margin-left: 400px;"> <math>2\sqrt{9+(-3)^2}</math>  <math>\times EI</math> <math>2\sqrt{18}</math>  <math>2(3)\sqrt{2}</math>  <math>6\sqrt{2}</math> </p> <p>13)  Solve the system of equations:  <math>x+y=4</math>  <math>2x-y=-13</math></p> <p>A. <del><math>x=-9, y=15</math></del>  B. <del><math>x=-5, y=-3</math></del>  C. <del><math>x=-3, y=1</math></del>  D. <del><math>x=-3, y=7</math></del>  <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">E. <math>x=1, y=3</math></span></p> <p style="color: red; margin-left: 400px;"> <math>2x+2y=8</math>  <math>- \quad 2x-y=-13</math>  <math>3y=21</math>  <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;"><math>y=7</math></span>  <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;"><math>x=-3</math></span> </p>	

**PUSH IT TO THE LIMIT.**